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IN THE

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1957.

No. 673

MINNESOTA MINING AND MANUFACTURING COMPANY,
Petitioner,

vs.

SEARS ROEBUCK AND COMPANY and THE PLYMOUTH RUBBER COMPANY, INC.,
Respondents.

PETITION FOR WRIT OF CERTIORARI

To the United States Court of Appeals for the Fourth Circuit.

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To the United States Court of Appeals for the Fourth Circuit.

To the Honorable Chief Justice of the United States, and the Associate Justices of the Supreme Court of the United States:

Your Petitioner prays that a Writ of Certiorari issue to the United States Court of Appeals for the Fourth Circuit to review that Court's Judgment filed April 1, 1957, and its order filed October 18, 1957, denying petitioner's motion to reopen and petition for rehearing.

OPINIONS BELOW.

A copy of the Opinion of the District Court, reported at 141 F. Supp. 686 and 110 USPQ 87, is found in the certified record, Vol. I, p. A19, and is reproduced in the appendix hereto at page 42.* The District Court also made separate findings of fact, pertinent parts of which are reproduced in the Appendix hereto (App. 49; R I, A-1).

A copy of the Opinion of April 1, 1957 of the Court of Appeals of the Fourth Circuit is reproduced in the record, Vol. IV, pp. 3-18, and in the appendix at page 23. This Opinion is reported at 243 F. 2d 136.

A further opinion of the Court of Appeals dated October 18, 1957 denying (1) a Petition for Rehearing and (2) a Motion to Reopen on ground of newly discovered evidence, each filed by the Petitioner (plaintiff) is reproduced in the record, Vol. IV, pp. 27-31, and at page 38 of the appendix hereto. This Opinion is reported at 115 USPQ 208.

JURISDICTION.

1. The judgment of the Court of Appeals for the Fourth Circuit is dated and was filed April 1, 1957 (App. 37; R IV, 19).

2. On April 27, 1957, within the thirty day period permitted by the rules of the Court of Appeals for the Fourth Circuit, that Court filed an order extending until June 1, 1957 Petitioner's time to apply for a rehearing (R IV, 23). On May 29, 1957, within the extended time, Petitioner filed in the Court of Appeals its petition for rehearing (R IV, 24). A rehearing was denied October 18, 1957 (R IV, 33), opinion (R IV, 27).

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* The certified record is in four volumes and Volume III, page 71, for example, is referred to as R III, 71; and the appendix hereto, page 41, for example, is referred to herein as App. 41.

3. The jurisdiction of this Court is invoked under Section 1254 (1) of Title 28, United States Code to review a judgment which reversed the judgment (R I, A15) of the United States District Court for the Middle District of North Carolina.

QUESTIONS PRESENTED.

1. Since a patent is addressed to the man "skilled in the art to which it pertains" (Sec. 112, Title 35, U. S. C.), and since what a patent teaches such man is a question of fact, can a Court of Appeals **justifiably** overrule the concurring findings, **as to what the patent teaches**, of the Board of Appeals of the Patent Office and of the District Court based upon the testimony of men skilled in the art, and as judges unskilled in the art substitute their inexpert reading of the patent for that of the experts?

2. All of the conditions of equivalency being met (the performance of the same functions in the same way to get the same result), is infringement avoided because the equivalent was not known at the date of the patent?

3. When a third party manufacturer (Rohm & Haas Co.), by adjusting its manufacturing processes to combine into one plasticizer for vinyl resins the functions of two plasticizers and announces to the trade that it has done so after the date of the Oace patent, does one who uses such tailored plasticizer escape infringement, under the doctrine of equivalents, of the claims of the Oace patent?

(a) Does one thus escape infringement of original claims 1, 3 and 4 of Oace, which specify two plasticizers?

(b) Does one thus escape infringement of reissue claims 6 to 9 of Oace, which do not require two plasticizers?

4. Is the doctrine of **U. S. Industrial Chemicals Co. v. Carbide & Carbon Chemicals Co.**, 315 U. S. 668, namely,

that a "mandatory" step of a process patent may not be omitted in a reissue, applicable to questions of validity and infringement of the Oace reissue combination claims in suit?

(a) Is such doctrine applicable where the Oace original and reissue claims are directed to a new article of manufacture, which is a pioneer invention, comprising a new combination of elements and the accused tape article employs a single plasticizer component in place of two plasticizer components of the original Oace claims, but which single component performs the same function in the same manner and with the same result?

(b) On the facts stated in (a), are not the original and reissue claims for the same invention?

(c) Construing the Oace reissue claims (6 to 9) so as not to require two plasticizers, as they were interpreted by the Patent Office, and as they were construed by the District Court in holding them to be infringed by the Plymouth tape containing a single liquid resinous plasticizer, are they valid?

5. (a) Since the plasticizers of the Oace patent and in the accused tapes function in the vinyl resin film backing of the tape in a purely physical manner, is it necessary in order to establish legal equivalency that chemical equivalency of the plasticizers must also be shown?

(b) Or is it sufficient in establishing equivalency between such substances to show that they perform the same function, in the same manner and with the same result, irrespective of whether or not they are chemically the same?

6. When it is shown for the first time, on a Motion to Reopen for the production of newly discovered evidence

further to support the fact that Paraplex G-25 had changed since Oace made his invention, that the Court of Appeals, in its findings in reversal of those of the District Court, placed reliance upon stifled recollection and dubious testimony of witnesses (at Rohm & Haas Co.) who were admonished by their corporate superior "not to try to recollect," is it proper under such circumstances for the Court of Appeals both to deny the Motion to Reopen and adhere to its reversal of the District Court's findings?

STATUTE INVOLVED.

The statute involved is Sec. 112, Title 35, United States Code, stating the requirements of the specification of a patent as addressed to persons skilled in the art, and for the first time making the recognition of equivalents a statutory requirement. That section reads as follows:

"§ 112. Specification.

"The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

"The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

"An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof. July 19, 1952, c. 950, § 1, 66 Stat. 798."

This section, effective January 1, 1953, replaced Sec. 33, Title 35, United States Code, set forth in a footnote;* and applies to "further proceedings on applications pending" on January 1, 1953, including the Oace reissued application then pending, see Sec. 4 (a) of the Patent Codification Act of July 19, 1952.

STATEMENT OF THE CASE.

This is a patent infringement action based on Oace et al. United States Reissue Letters Patent No. 23,843, issued to petitioner on June 29, 1954** (R I last patent). The original patent was applied for January 12, 1946, and was granted July 10, 1951. The patent relates to a stretchable and retractable pressure-sensitive insulating tape commonly sold in roll form.

The District Court held the patent valid and infringed (141 F. Supp. 686, App. 42). The Court of Appeals, Fourth

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* "§ 33. Application for patent; description; specification and claim.

"Before any inventor or discoverer shall receive a patent for his invention or discovery he shall make application therefor, in writing, to the Commissioner of Patents, and shall file in the Patent Office a written description of the same, and of the manner and process of making, constructing, compounding, and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound, and use the same; and in case of a machine, he shall explain the principle thereof, and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions; and he shall particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery. The specification and claim shall be signed by the inventor. No plant patent shall be declared invalid on the ground of noncompliance with this section if the description is made as complete as is reasonably possible. R. S., § 4888; Mar. 3, 1915, c. 94, § 1, 38 Stat. 958; May 23, 1930, c. 312, § 2, 46 Stat. 376."

** Two suits initially were filed, but were consolidated for trial. The defendants in one suit did not appeal from the judgment adverse to them, and are not respondents herein.

Circuit, reversed as to infringement (243 F. 2d 136, App. 23); and denied a rehearing October 18, 1957 (115 USPQ 208, App. 38).

The specification of the reissue is identical with the original except for the italicized portions in the reissue. These portions do not contain any additional disclosure of a tape or how to make it, but simply comment on the novelty of the tape or give a definition of a term (Finding 32, App. 49). The claims added by the reissue, viz., 6, 7, 8 and 9, are in italics. Claims 1, 3, 4 and 6-9 are in issue. Original Claim 1 and reissue Claim 6 are typical.

The central problem to which the patent in suit is addressed, and which it solved, was to provide an easily stretchable and highly elastic pressure-sensitive adhesive electrical insulating tape comprising a well-bonded, water-insoluble, non-corrosive, normally tacky and pressure-sensitive coating on a plasticized vinyl chloride polymer film, which plasticized film backing is in permanent equilibrium with the adhesive (Finding 30, App. 49).

By "permanent equilibrium" it is meant that the pressure-sensitive adhesive layer neither softens nor loses its tack on prolonged contact with the plasticized film backing layer because of migration or exudation of the plasticizer from the film backing (Oace patent, Col. 2, line 55, to Col. 3, line 12).

Commercially and practically, the patented tape is an entirely new thing, broadly differing in character and kind from anything which preceded it (Opinion, CA 4, App. 25). The new tape was "revolutionary"; its commercial success was "phenomenal" (D. C. Opinion, App. 48). Sales of the Oace tape by petitioner began in February, 1945, and grew from $8,000.00 in 1945 to over $8,000,000.00 in 1953 (R II, 180).

The patentees, in setting "forth the best mode contemplated by the inventor of carrying out his invention" (Sec.

112, Title 35) "employ with the vinyl chloride polymer a combination of modifiers (plasticizers) including a substantial but minor amount. . . of a low molecular weight liquid plasticizer such as dioctyl phthalate, together with a substantially equal or somewhat greater amount of high molecular weight resinous type plasticizer" (Oace Patent, Col. 3, lines 21-35).

Paraplex G-25 is the preferred example of the resinous type plasticizer (Oace Patent, Col. 3, lines 33-35). Paraplex G-25 is made by Rohm & Haas Co., formerly Resinous Products & Chemical Corp. Paraplex G-25, was first offered for sale in 1943. Paraplex G-40, another Rohm & Haas plasticizer, was first available in late 1945. The Oace patent was granted July 10, 1951.

The plasticizers in the vinyl backing modify it so that it becomes stretchable and retractable. This modification of an ordinarily inelastic substance is a purely physical phenomenon, with no chemical reaction involved. To this fact both experts agreed (R II, 27, 95).

The major part of the accused tape employs Paraplex G-40 as the sole plasticizer; a very minor part employs new vintage (1954 or later) Paraplex G-25. Both types of tape were held not to infringe by the Court of Appeals in reversing the District Court. The latter Court held that recent vintage G-25 had been modified by polymerization processes (Finding 49, App. 53) and that it and the later G-40 were each the equivalent of early vintage G-25 plus dioctyl phthalate.

Each party recognized* that in view of the reference in Column 3 of the patent specification to Paraplex G-25, it was important to determine whether there had been a change in that product over the years, from and after the

* "I felt it important to learn whether or not any change had been made in G-25 over the years" (Kirkpatrick, counsel for defendants, R III, 17).

time the patentees worked with it in 1944-45. Paraplex G-25 is made by polymerizing the reaction product of propylene glycol and sebacic acid (Finding 38, App. 50). Paraplex G-40 is the polymerized reaction product of adipic acid and propylene glycol (Finding 38, App. 50).

In the process of polymerization, the composition of the resultant product depends upon the conditions employed, for example, time, temperature, catalyst, and other factors, so that different types of polymers can be produced as desired (Finding 39, App. 50).

Paraplex G-40 and new vintage Paraplex G-25 are represented by the manufacturer (Rohm & Haas) to be "tailor-made", and to combine to marked degree many of the desirable features of liquid ester plasticizers, such as dioctyl phthalate, with those features obtainable in resinous plasticizers (Finding 40, App. 51).

In 1954, the first year in which anyone was able to make tape with G-25 as the sole plasticizer, Rohm & Haas announced in one of its publications (Defendants' Exhibit 50, R II, 189-190):

> "* * * Research investigators, therefore, focused their efforts on **tailoring** plasticizers to meet **specific**, often stringent, application and process requirements * * *" (Emphasis added.)

"Electrical Tape.

> "**The requirements for electrical tape are very critical** because of the need for a combination of good electrical properties, resistance to migration into rubber-based adhesives employed, and freedom from exudation on exposure to high humidity." (Emphasis added.)

Although a patent is drafted in terms addressed to men skilled in the art, the Court of Appeals on its own reading of the Oace patent set aside (1) the administrative

ruling of the Board of Appeals of the United States Patent Office in granting the reissue claims which find response in a resinous plasticizer used solely; (2) the testimony of the experts on both sides that the patent teaches the use of single resinous plasticizer and does not require two plasticizers (R II, 45, 91-92); and (3) the findings of the District Court as to what the patent teaches (Finding 31, App. 49), and its corollary findings as to equivalence and infringement.

The District Court found that G-25 had changed significantly over the years (Finding 49, App. 52), but the Court of Appeals rejected this finding. The rejection was based upon a letter from patent counsel for Rohm & Haas, stating as a conclusion that there had been "no significant change" in G-25 since it was first sold, which letter is quoted in a footnote in the Opinion of the Court of Appeals (App. 34).

It was shown in petitioner's motion to reopen, and was not disputed, that the Rohm & Haas' witnesses who testified that G-25 had not changed significantly were under a stifling mandate from company management:

> "* * * Above all, it is important that you do not undertake to recall discussions or events which took place some years ago involving our plasticizers and vinyl polymers, nor should you express opinions on matters relating to this dispute * * *" (R III, 27).

BASIS FOR FEDERAL JURISDICTION IN THE DISTRICT COURT.

This is a patent infringement suit brought in the District Court of the United States for the Middle District of North Carolina under authority of Section 1338 (a), Title 28, U. S. C., providing exclusive, original jurisdiction in the District Courts of the United States of any civil action arising under Acts of Congress relating to patents.

ARGUMENT AMPLIFYING REASONS FOR ALLOWING THE WRIT.

I.

An Important Question of Patent Law Has Been Decided in a Manner in Conflict With the Decisions of This Court.

a) The arbitrary substitution by the Court of Appeals of its inexpert views as to what the technical Oace specification teaches men skilled in the art to which it pertains, contrary to the determination of the Patent Office Board of Appeals in granting the reissue and contrary to the Findings of Fact of the District Court based upon the concurring testimony of the **experts** of **both** parties, is in direct conflict with this Court's directions in **Webster Loom v. Higgins**, 105 U. S. 580, 585, 586, 26 L. Ed. 1177, 1179; **Seymour v. Osbourne**, 11 Wall. (U. S.) 516, 544, 546, 20 L. Ed. 33, 38, 39; **U. S. Industrial Chemicals v. Carbide & Carbon Chemicals Corp.**, 315 U. S. 668, 678.

b) In so substituting it's necessarily inexpert views for that of testimony of men skilled in the art, the Court below ignores the provisions of Rule 52 (a) of the Federal Rules of Civil Procedure promulgated by this Court and strongly supported in **Graver v. Linde**, 339 U. S. 605, 609, 610; **U. S. v. Yellow Cab Co.**, 338 U. S. 388, 341, 342; **United States v. National Association of Real Estate Boards**, 339 U. S. 485, 495, and other cases.

c) This unwarranted departure from recognized judicial procedure does violence to the provisions of Section 112, Title 35, U. S. C., that a patent is directed to persons skilled in the art.

By whom and in what manner it is to be determined what a patent teaches to persons skilled in the art to which

it pertains is a question of grave public importance. It is a question which affects the trial of all patent infringement suits and the form in which patent specifications should be filed in the Patent Office.

What that teaching is, can be determined only from evidence adduced from those skilled in the art. The Supreme Court has said so unmistakably.

This Court in the **Webster Loom** case, supra, pointed out at quite some length that a technical patent specification is drawn in language for the man skilled in the art to which the invention pertains. The Court, for comparison, referred to astronomy and the understanding by a fellow astronomer of a technical report which would be "all Greek to the unskilled in science", and then stated (p. 586):

> "Applying these remarks to the specification before us and referring to the extract already made, setting forth the nature and object of the invention, it is easy to conceive that its meaning **may be plain to those for whose use it is intended.** They know at once what is meant by the terms, 'reciprocating or driving slide', 'sliding bar', 'withdrawing and inserting devices', 'trough', 'wire', 'wire box', 'lay', etc., etc. They also understand the movements referred to, and the objects to be attained by each device. (Emphasis added.)
>
> "In like manner, if we follow the specification in its description of the invention in detail, with the reference to the drawings and the closing summary of the patentee's claims, the same method of interpretation will be applicable. And as **it cannot be expected that the court will possess the requisite knowledge for this purpose**, it becomes necessary that it should avail itself of the light furnished by the evidence to enable it to understand the terms used in the patent and the devices and operations described or alluded to therein. * * * " (Emphasis added.)

In **Seymour v. Osbourne**, supra, this Court in considering a reissue said (p. 546):

> "* * * Cases, doubtless, arise where the language of the specification and claim, both of the surrendered and reissued patents, is so interspersed with technical terms and terms of art that the testimony of scientific witnesses is **indispensable** to a correct understanding of its meaning. Both parties in such a case would have a right to examine such witnesses, **and it would undoubtedly be error** in the court to reject the testimony. * * *" (Emphasis added.)

In **U. S. Industrial Chemicals v. Carbide & Carbon Chemicals Corp.**, supra, this Court in reviewing a reissue and original specification said (p. 678):

> "Although it is the duty of a court to determine for itself, by examination of the original and the reissue, whether they are for the same invention, it is permissible, and often necessary, to receive expert evidence to ascertain the meaning of a technical or scientific term or term of art so that the court may be aided in understanding not what the instruments mean but what they actually say."

How can the Court of Appeals ignore the interpretation of the experts in the Patent Office and the expert witnesses who testified at the trial and independently interpret the following portion of the Oace patent specification:

> "It will be understood that, where specific ratios of specific polymers, low molecular weight plasticizers, and high molecular weight plasticizers are described in the examples, substitution of equivalent but somewhat different materials may require alteration of these ratios in order to obtain equivalent results, all in conformity with well-recognized principles" (Oace patent, col. 5, lines 31 to 38).

In reversing the Trial Court, and in rejecting its findings as to what the patent specification teaches the man skilled in the art, the Court of Appeals is establishing the rule that the technical explanations of a patent specification (not the claims) are to be read solely by non-experts in the art—judges, to be specific—, and that such reading takes precedence over the concurring reading and interpretation of the technology given by the Patent Office Board of Appeals and by witnesses skilled in the art.

The Court of Appeals based its decision in large measure upon a misapplication of the decision of this Court in **U. S. Industrial Chemicals, Inc., v. Carbide & Carbon Chemicals Corp.**, 315 U. S. 668. If the teaching of the Oace patent is that found by the Patent Office in granting the reissue and as confirmed by the Findings of the District Court, the **Industrial Chemicals** case has no application. That case, quoted at length in the Court of Appeals Opinion (App. 29), held that a reissue was invalid which omitted a "mandatory" step of the original patent, and hence was not for the same invention.

The electrical tape of Oace is made by producing a stretchable and retractable vinyl film backing and coating it with an adhesive. To prevent injury to and loss of tack in the adhesive, Oace taught that the plasticizer system used in the vinyl backing had to have certain characteristics.

In the specification, Oace mentioned more than one plasticizer. He described in some detail a combination of two plasticizers, one a so-called resinous plasticizer, Paraplex G-25 by name, to which he added a liquid dioctyl phthalate. Another resinous plasticizer was polymerized ethyl acrylate.

An important issue arose in the District Court as to the meaning of the language of the Oace patent description, namely, whether the language taught (a) that two plasti-

cizers, one resinous and one liquid, are necessary, or (b) that a resinous plasticizer such as ethyl acrylate alone, or other single resinous plasticizers incorporating the combined functions of old vintage Paraplex G-25 and dioctyl phthalate could suffice to make the new product. The District Court determined, as did the Patent Office, that the Oace patent does not require the use of two plasticizers and teaches the use of a single plasticizer.

It needs no comment that such an issue is highly technical, and depends upon what the specification means to the man skilled in the art. At the trial, the expert for **each side** testified that the specification taught that a single resinous plasticizer, ethyl acrylate, could be used. Other testimony revolved around whether G-25 had been changed since the specification was written, so that new vintage G-25 can be used alone. On whether G-25 had been changed, there was a mass of conflicting evidence.

We do not analyze all the evidence; we merely indicate enough to demonstrate that the issue was deeply technical, and that, in the District Court, the issues were resolved by findings of fact, based upon the testimony of expert witnesses, and upon other evidence of specialized meaning to those skilled in the art. These findings were all in favor of Petitioner.

Holding that the Oace patent specification did not teach those skilled in the art that a single resinous plasticizer is sufficient to make the new tape product, without any added "liquid" plasticizer, the Court of Appeals reversed these findings of fact.

Finding as it did that the Patent Office, the experts, and the District Court were wrong, and finding that the Oace patent specification teaches only the use of two plasticizers, the Court of Appeals, relying upon the **Industrial Chemicals** case, determined there was no infringement because the accused tape used only one plasticizer, and held that it omitted an essential ingredient.

Irrespective of the specification as a whole, the Court of Appeals took an isolated paragraph* from the Oace patent, and the Court itself interpreted such language to mean that always and without exception, two plasticizers are necessary, despite the contrary testimony and evidence upon all of which the District Court based its findings.

It is quite evident from the decision that the Court of Appeals treated the language which it quoted, as a disclaimer of all solely resinous plasticizers, despite all the testimony of expert witnesses and other evidence, that to those skilled in the art, the patent as a whole **does** teach that resinous plasticizers alone, such as G-40, and **new** G-25 (changed since 1945), can be used without any "liquid".

Substituting its own concepts of the technology taught, for that of the findings of the District Court, the Court of Appeals flatly said:

> "The specification does not show that ethyl acrylate polymer may be used as the sole plasticizer but, to the contrary, clearly teaches that it is to be used in place of the resinous plasticizer called for by the patent."

Everything said by the Court of Appeals focuses toward the one proposition, that, to it, based solely upon its reading of the specification, and disregarding all evidence of those skilled in the art, including the interpretation of the Patent Office, the findings of the District Court were

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* "While resinous or high molecular weight modifiers such as 'Paraplex G-25' are themselves capable of producing the desired degree of strength, stretch and elasticity in vinyl chloride polymer films, and furthermore are generally classed as 'non-migrating' or 'permanent' type modifiers or plasticizers, it is surprisingly found that these materials do not provide for permanent equilibrium of adhesive and backing as herein defined. Instead, it has been shown that pressure-sensitive adhesives in prolonged contact with highly stretchable and elastic films consisting solely of vinyl polymer and resinous modifier lose a great deal, if not all, of their initial tackiness or pressure-sensitivity."

"not in accord with the great weight of the evidence."* In short, the Court of Appeals has substituted its lay reading of the specification for that of the persons skilled in the art, to whom by statute the patent is addressed

Rule 52 (a) provides "* * * Findings of fact shall not be set aside unless clearly erroneous, and due regard shall be given to the opportunity of the trial court to judge of the credibility of the witnesses * * *." In respect thereto, in **United States v. National Association of Real Estate Boards**, 339 U. S. 485, this Court said (p. 495):

> "It is not enough that we might give the facts another construction * * *."

In **U. S. v. Yellow Cab Co.**, 338 U. S. 388, Mr. Justice Jackson pointed out that where the evidence would support a conclusion either way (p. 342):

> "* * * Such a choice between two permissible views of the weight of evidence is not 'clearly erroneous' * * *."

(In the instant case, **both** experts testified that the Oace specification taught them to make the tape using polymerized ethyl acrylate as the sole plasticizer.)

In **Graver v. Linde**, 339 U. S. 605, this Court in discussing equivalence as a fact determination said (p. 609):

> "A finding of equivalence is a determination of fact. Proof can be made in any form; through testi-

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* In weighing the evidence, the Court of Appeals gave prime effect to a letter of an attorney for Rohm & Haas Co.: see Opinion, page 14 (R IV, 16; App. ...). This letter and other testimony of Rohm & Haas people was later shown to be the product of stifled recollection and regimentation, as the Rohm & Haas people had been directed by top management: "Above all, it is important that you do not undertake to recall . . ." (R III, 27). Such testimony "polluted" the "waters of justice": *Mesarosh v. United States*, 352 U. S. ...; 1 L. ed. 2d 1, 9 (Nov. 5, 1956). This illustrates the hazard involved when a Court of Appeals indulges in an almost cavalier disregard of the District Court's findings.

mony of experts or others versed in the technology; by documents, including texts and treatises; and, of course, by the disclosures of the prior art. Like any other issue of fact, final determination requires a balancing of credibility, persuasiveness and weight of evidence. It is to be decided by the trial court and that court's decision, under general principles of appellate review, should not be disturbed unless clearly erroneous. Particularly is this so in a field where so much depends upon familiarity with specific scientific problems and principles not usually contained in the general storehouse of knowledge and experience."

What the Court of Appeals has done is to constitute itself a board of technicians, and, as such, to undertake to second-guess the experts on what the man skilled in the art learns from the specification.

Since, by virtue of the provisions of Section 112, a patent is addressed to the man skilled in the art, it would seem to be a matter of ineluctable logic that what is taught and disclosed by the patent is a question of fact, for no one except the person skilled in the art can answer the question as to what is taught and disclosed to him. The skilled person subjectively knows the answer. The unskilled person must be told.

Consequently, the Court of Appeals has:

(1) Ignored the admonition of this Court as expressed in **Webster Loom v. Higgins, Seymour v. Osbourne,** and **Industrial Chemicals v. Carbide & Carbon**;

(2) Ignored the provisions of Rule 52 (a) as interpreted in **Graver v. Linde, U. S. v. Yell w Cab Co.,** and **U. S. v. National Association of Real Estate Boards**; and

(3) Ignored the mandate of Section 112 that a patent is addressed to persons skilled in the art.

The Court below decided the case as it might interpret an ordinary contract, in which capacity it is expert. But by assuming an expertness in technology it ran counter to the directives of this Court, counter to the requirement of the statute (35 U. S. C. 112), and afoul of Rule 52 (a).

For these compelling reasons, it is of importance to the public generally that the writ be granted in order to secure harmonious administration of justice.

II.

The Supreme Court Has Not Decided Since the Advent of the Patent Act of 1952, Which Gives First Statutory Recognition to the Doctrine of Equivalents, Whether an Equivalent Must Have Been Known at the Date of the Patent.

The question of whether an ingredient, to be an equivalent under the doctrine of equivalents, must have been known at the date of the patent, arose in this case. In the Opinion of April 1, the Court said (App. 36): "... but it is certain that the inventors were unaware of this fact. ..." The fact referred to is that the polymerized products, modified G-25 and G-40, could be used alone. Chief Judge Parker, at the oral argument of petitioner's motion to reopen, interrogated counsel for both parties as to whether an equivalent had to be known at the date of the patent, and in the Opinion of the Court of Appeals, dated October 18, 1957, that question

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* The Court of Appeals does not deny that the G-40 and modern G-25 of defendants' tape are actually equivalent, and acknowledges: "It may be that the lower weight molecules in the resinous plasticizers perform the function which the patent attributes to the liquid plasticizer in making the finished product ..." (App. 36). The District Court affirmatively found that G-40 (and modern G-25) "functions in the same way to give essentially the same results" and "produces the same results in the same way by the same or equivalent means as the examples of the patent in suit" (App. 51-54, Findings 44-47 and 50-52).

is referred to. In a footnote to the Opinion cases are cited with holdings contrary to each other (App. 41).

Walker on Patents, Deller's Edition, page 1702, cites a number of Supreme Court decisions as holding that a claimed equivalent need not have been recognized as such at the time of the granting of the patent. The footnote of the Court of Appeals cites Supreme Court cases as asserting a contrary view.

But each Supreme Court case cited, whether by **Walker** or by the Court of Appeals, was decided prior to the enactment of the Patent Act of 1952, United States Code, Title 35.

The applicable portion of the Act is the third paragraph of Section 112 (supra, page 5), which provides:

> " . . . and such claim shall be construed to cover the corresponding structure, material or acts described in the specification **and equivalents thereof.**" (Emphasis added.)

In this provision is found the first **statutory** recognition of the doctrine of equivalents, but the doctrine has been case law since a very early date, both in the Supreme Court and other federal courts.

The statutory requirement to recognize equivalents makes no reference to any date as to when an equivalent must be known. The omission of such limitation indicates legislative intent to impose none.

Recognized authority, as **Walker**, and the courts differ on what the Supreme Court has held prior to the statute. The Court of Appeals for the Second Circuit held as recently as August 1, 1957, that an equivalent need not have been known at the date of the patent.[1] And in an

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[1] *Technical Tape Corporation v. Minnesota Mining & Manufacturing Company*, 247 F. (2d) 343.

earlier case[2] analyzed **Imhaeuser v. Buerk**, 101 U. S. 647, 655, 656, and determined that that decision did not require a claimed equivalent to have been known at the date of the patent, for the **Imhaeuser** case dealt only with equivalents which were known at the date of the patent.

The First, Third, and Eighth Circuits have expressed views similar to that held by the Second Circuit. **American Sulphate Pulp Co. v. Howland Falls Pulp Co.**, 80 F. 395, 410, 1 Cir., 1897; **Polygon Products Corp. v. Kant-Rust Products Corp.**, 292 F. 569, 572, 3 Cir., 1923 ("To require that would be to require prophesy as the price of patenting"); **Kinlock Telephone Co. v. Western Electric Co.**, 113 F. 652, 657, 8 Cir., 1902.

Reference has been made above to the statement of the Fourth Circuit in this case that the inventors did not know of the equivalence of G-40 and modified G-25.

The title of the 1952 Patent Act is "An Act to Revise and Codify the Laws Relating to Patents and the Patent Office, and to Enact Into Law Title 35 of the United States Code Entitled 'Patents.'"

If the provisions of the third paragraph of Section 112 are viewed as a revision, there is presented the question of whether the absence of any limitation as to when an equivalent is required to be recognized as such, removes any such limitation, as imposed by some decisions.

On the other hand, if the provisions of the new act are viewed as a codification of existing law and decisions, a pertinent inquiry is: What was such existing law?

In either case, there is presented for definitive determination an issue of first impression. What does the statute mean? Does prior case law impose limitations not

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[2] *Finkelstein v. Kress*, 113 F. (2d) 431, 433.

expressed? Did the Congress intend to revise case law? If it did, what was such case law?

These questions are of vital importance in the patent field. With most valid patents, the issues of infringement are complicated by questions of equivalence, for few accused articles or processes are Chinese copies.

This case presents questions which have not been, but should be, authoritatively and definitively settled by this Court. So far as is known to petitioner, this case presents to the Supreme Court the first occasion upon which call is made upon it to interpret Section 112 in two vital aspects: (1) "the person skilled in the art to which it pertains," and (2) "equivalents thereof."

CONCLUSION.

For the reasons stated, this Petition for Writ of Certiorari should be granted.

Respectfully submitted,

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December 12, 1957.

OPINION OF THE COURT OF APPEALS.

(April 1, 1957)

Soper, Circuit Judge.

The complaint in this suit charges infringement of United States Reissue Patent No. 23,843 granted on June 29, 1954, to Ralph J. Oace, Robert Burns Snell, and Esther E. Le Page, assignors to Minnesota Mining and Manufacturing Company, the plaintiff in the District Court. The original patent No. 2,559,990 was dated July 10, 1951, and the application for reissue was filed July 9, 1952.

The invention relates to the insulation and protection of electrical conductors. For this purpose the patent specifies an adhesive insulating tape, composed of a film backing mixed with a non-volatile liquid plasticizer, a soft and viscous resinous plasticizer, and an adhesive coating united to the inner surface of the film backing. The claims of the reissued patent in issue in the pending case are claims 1, 3 and 4, which are identical with like numbered claims of the original patent, and claims 6, 7, 8 and 9, which are new in the reissued patent. Typical claims 1 and 6 are set out in full below [1]

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[1] *Claim 1*

"1. A pressure-sensitive adhesive insulating tape wound upon itself in roll form and comprised of: a stretchable and elastic film backing having a thickness of 4 to 20 mils and formed of a homogeneous mixture primarily consisting of a stable blend of a film-forming polymer of monomers including at least a major proportion of vinyl chloride, a substantially non-volatile liquid phytalyl ester plasticizer amounting to 8 to 20 parts per 100 parts of said polymer, and a soft and viscous low-acid-number alkyd plasticizer resin in amount at least equal to the amount of said liquid phthalyl ester plasticizer, the total amount of said plasticizers being about ⅓ to ½ the amount of said polymer and the proportions being such that the adhesive tape has the properties of stretch and elasticity hereafter specified without causing pastiness or tack-loss of the contacting adhesive in the roll; and a cucohesive normally tacky and pressure-sensitive rubber-resin type adhesive coating united to the inner face of said

The defendants are Sears, Roebuck and Company and Plymouth Rubber Company, Inc. Sears sold a stretchable and retractable pressure-sensitive tape under the brand name of "Homart", which was manufactured by Plymouth and is alleged to have infringed the patent. The main de-

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film backing; said adhesive tape being unwindable without delamination or offsetting of adhesive being originally stretchable by hand-pulling to an extent of at least 50% at room temperature and being substantially completely retractable from an elongation of 30% as herein specified."

Claim 6

"6. A pressure-sensitive adhesive insulating tape wound upon itself in roll form and comprising; (1) a water-insoluble and hydrocarbon-oil-insoluble film backing of high dielectric strength containing a stabilizer and having a thickness of 4 to 20 mils and formed of a homogeneous mixture primarily consisting of a stable blend of (a) a film-forming polymer of monomers including at least a major proportion of vinyl chloride, and (b) a substantially non-volatile plasticizing material therefor in an amount within the range of at least 1/3 the weight of said polymer but in a substantially lesser amount than said polymer and comprising at least a major proportion of a non-migrating viscous plasticizer resin, and the proportions being such that the adhesive tape has the properties of stretch, elasticity and retractability hereafter specified without causing pastiness or loss of the tack of the contacting adhesive in the roll; (2) an adhesive primer coating on the inner face of the film backing adapted to increase the anchorage of the adhesive coating; and (3) a water-insoluble normally tacky and pressure-sensitive rubber-resin type adhesive coating united to the inner face of said film backing, over said primer coating, said adhesive coating being thin in relation to said film backing; said film backing being in permanent equilibrium with said pressure-sensitive adhesive coating so as to avoid pastiness or loss of tack of said adhesive coating and diminution of the flexibility of said film backing; said adhesive tape being unwindable from the roll without delamination of the tape or offsetting of the adhesive, being originally stretchable in widths not greater than about one inch by simple hand-pulling, exercising a force of not more than about 10 to 15 pounds, to an extent of at least 50% at room temperature and being substantially completely retractable from an elongation of 30%, as herein specified; said tape being readily conformable to irregular surfaces in insulating wire splices and its elasticity, retractability and high adhesion value making it easy, in insulated splices, to produce snug wrappings and coverings, and said tape having sufficiently aggressive adhesiveness to remain tightly and snugly wrapped around splices and wires."

fenses are (1) that the accused article does not infringe the claims of the patent because there was omitted from its composition one of the ingredients specified in the claims, and (2) that claims 6 to 9, which first appeared in the reissue, are invalid if construed to omit that element from the patented structure. The District Judge held all the claims valid and infringed.

The insulating tape manufactured by the plaintiff under the patent was a great improvement over prior insulating devices and met with much commercial success. The materials which entered into the composition of the new tape were well known. Vinyl resin, plasticizers and pressure-sensitive adhesives were all old. The problem was to plasticize the vinyl resin in the backing member so that the plasticizer would not migrate into the adhesive and impair its cohesive function, and so that portions of the plasticizer would not exude from the surface of the film upon the underlying adhesive layer when the tape was wound in a roll and cause a loss of tack. The inventors overcame these difficulties and produced a strong, stretchable and retractable article that furnished effective insulation in the splicing of electric wires and cables.

This result was accomplished by securing a permanent equilibrium between the vinyl backing and the adhesive by combining the ingredients in the manner described in the following excerpt from the specification of the patent:

> "In order to secure permanent equilibrium between backing and adhesive, we employ with the vinyl chloride polymer a combination of modifiers including a substantial but minor amount (not to exceed about 20 parts per 100 parts of the vinyl polymer) of a low molecular weight liquid plasticizer such as dioctyl phthalate, together with a substantially equal or somewhat greater amount of a high molecular weight resinous type plasticizer, the amount of the latter in

any event being sufficient, together with the liquid plasticizer, to provide the desired degree of stretch in the final film. "Paraplex G-25" is a preferred example of a suitable resinous type plasticizer. It is sold by Resinous Products & Chemicals Corp., and is a soft, viscous alkyd resin having a specific gravity of 1.06, and an acid number of not more than 2.0; it is soluble in esters, ketones, aromatic and chlorinated hydrocarbons. Another high-molecular-weight plasticizer material which has been found useful in providing suitably stretchable and elastic vinyl polymer films is polymerized ethyl acrylate. Another example is polymerized vinyl butyl ether.

"While resinous or high molecular weight modifiers such as "Paraplex G-25" are themselves capable of producing the desired degree of strength, stretch and elasticity in vinyl chloride polymer films, and furthermore are generally classed as "non-migrating" or "permanent" type modifiers or plasticizers, it is surprisingly found that these materials do not provide for permanent equilibrium of adhesive and backing as herein defined. Instead, it has been shown that pressure-sensitive adhesives in prolonged contact with highly stretchable and elastic films consisting solely of vinyl polymer and resinous modifier lose a great deal, if not all, of their initial tackiness or pressure-sensitivity. When tape made in this way is unwound from roll form, after a moderate period of storage, and applied to a splice, it does not adhere either to the electrical conductor or to its own backing, and hence is of no value as an insulating and protective coating."

Based on this disclosure, typical claim 1 of the patent clares that the patented tape is comprised of an elastic backing formed of a homogeneous mixture consisting a blend of (1) a major proportion of vinyl chloride, (2)

a substantially non-volatile liquid phytalyl ester plasticizer, (3) a soft and viscous low-acid-number alkyd plasticizer resin in amount at least equal to the amount of the liquid plasticizer, and (4) a pressure-sensitive rubber resin type adhesive coating united to the inner surface of the film backing.

Testimony bearing on the investigation and experiments which lead to the invention confirms the foregoing statement in the specification as to the ingredients of the product listed in claim 1. In 1938 or 1939, the plaintiff commenced its efforts to make a suitable adhesive plastic tape, using commercial vinyl (VYNS) with 25% to 40% of liquid tricresyl phosphate plasticizer, and a standard pressure-sensitive adhesive; but the experiment was unsuccessful, because the plasticizer migrated and made the adhesive very soft and pasty. In 1942 or 1943, Rohm and Haas, a widely known chemical company of Philadelphia, produced a new type of high-molecular-weight resinous plasticizer known as "Parapiex G-25", which could be combined satisfactorily with vinyl without causing migration. Early in 1944 plaintiff's research workers, to whom the patent in suit was subsequently issued, began to experiment with G-25 in combination with standard vinyl and standard adhesives from stock in an effort to make a satisfactory insulating tape. They found that G-25 did not migrate to the adhesive or soften it as the liquid plasticizer had done, but it did cause a loss of tack in the adhesive. Thus finding that neither the liquid nor resinous plasticizer when used alone gave satisfactory results, they tried a mixture of the two using a combination of dioctyl phthalate (DOP), a low-molecular-weight plasticizer, and G-25, a high-molecular-weight resinous plasticizer. This combination solved the difficulty and subsequently lead to the production and sale of the plaintiff's commercial article in 1945 and to the application for the original patent in 1946. The product speedily came into wide use and sales ad-

vanced from a little over $8000 during the year 1945 to more than $8,000,000 in 1953.[2]

The defendant, Plymouth Rubber Company, entered the field subsequently and began to experiment with adhesive vinyl plastic tape in 1948. It also had migration difficulties when it used the standard liquid plasticizer DOP and also found that G-25 was hard to disperse. Thereupon it experimented with G-40 as the sole plasticizer and found that it gave satisfactory results. Using it as the sole plasticizer the defendant produced a commercial article, which it put on the market in 1950 before the original patent was issued on July 10, 1951. The plasticizer G-40 was also manufactured by Rohm and Haas in 1945. It is a high-molecular-weight resinous plasticizer similar to G-25 but less expensive. It had also been used experimentally as the sole plasticizer by plaintiff's researchers, who reported that it was substantially equivalent to G-25 and caused a loss of tack but less loss than G-25. In 1946 or 1947, the plaintiff substituted G-40 for G-25 in the mixture with DOP in its commercial operations and this mixture became its standard commercial product.

In 1954, Plymouth found that by using a certain wax G-25 could be used successfully with vinyl as the sole plasticizer and prior to the institution of the pending suit made and sold such a product to the United States and, to some extent, to the general trade. In the complaint filed in the pending case, plaintiff charges infringement by the defendant by the use of both G-25 and G-40 as the sole plasticizer.

The facts so far related give substance to the main defense to the suit that the defendants did not infringe the

[2] As we have seen, claim 1 of the patent calls for a liquid plasticizer amounting to 8 to 20 parts per 100 parts of the film backing and a soft and viscous plasticizer resin in an amount at least equal to the amount of the liquid plasticizer. Claim 4 prescribes the use of 70 parts of vinyl, 10 parts of liquid plasticizer and 20 parts of resinous plasticizer.

patent because they omit from their production one element or ingredient, to wit, the liquid plasticizer, which is specified in the claims of the patent. It is well established that there is no infringement when this occurs even though the same result is obtained because the accused article is not covered by the claims of the patent. See **Vance v. Campbell**, 1 Black, 427, 429; **Acme Steel Co. v. Eastern Venetian Blind Co.**, 4 Cir., 227 F. 2d 914; **Anthony v. Sherman**, 4 Cir., 159 F. 2d 995; **Kaumagraph Co. v. Superior Trade Mark Mfg. Co.**, 2 Cir., 72 F. 2d 417; **Wichita Visible Gasoline Pump Co. v. Clear Vision Pump Co.**, 8 Cir., 19 F. 2d 435. This defense is not avoided by securing a reissue of a patent and omitting the disputed element from the claims unless the invention disclosed in the reissue is the very invention intended to be secured by the original patent. In **U. S. Industrial Chemicals Inc. v. Carbide Carbon Chemicals Corp.**, 315 U. S. 668, the patent before the Court related to the production of ethylene oxide by bringing ethylene and oxygen in the reaction chamber in the presence of a catalyzer and of water as an essential. The Court held that a reissue of the patent, which treated the introduction of water as permissive but not mandatory, was void since it was not for the same invention described and intended to be secured by the original patent. The Court said, pp. 675-676:

> "The question is whether, in the light of the disclosures contained in the two patents, they are for the same invention. This court has said that they are if the reissue fully describes and claims the very invention intended to be secured by the original patent; if the reissue describes and claims only those things which were embraced in the invention intended to have been secured by the original patent; if the broader claims in the reissue are not merely suggested or indicated in the original specification but constitute parts or portions of the invention which were intended or

sought to be covered or secured by the original patent. The required intention does not appear if the additional matter covered by the claims of the reissue is not disclosed in the original patent. If there be failure of disclosure in the original patent of matter claimed in the reissue, it will not aid the patentee that the new matter covered by the reissue was within his knowledge when he applied for his original patent. And it is not enough that an invention might have been claimed in the original patent because it was suggested or indicated in the specification. It must appear from the face of the instrument that what is covered by the reissue was intended to have been covered and secured by the original."

The plaintiff in its reply does not challenge the established doctrine that a product patent is not infringed by an article which omits one of the elements of the patented structure, but advances the counter-contention that the defendants have misinterpreted the teaching of the patent. It is now said that the patent discloses that the insulating tape, in addition to the vinyl and the adhesive, may be made either with a blend of liquid and resinous plasticizers or simply with a resinous plasticizer alone which combines within itself both light and heavy molecules; and that claims 1 to 5 of the patent cover a tape of the first sort while claims 6 to 9 cover a tape in which only a resinous plasticizer is used. This view is based largely upon certain statements in the specification that polymerized ethyl acrylate "has been found useful in providing suitable, stretchable and elastic vinyl polymer films." The evidence shows that this substance described in the specification as "another high-molecular-weight plasticizer material" also contains molecules of relatively low weight; and the Judge found that "the patent in suit teaches persons skilled in the art that ethyl acrylate polymer may be used as the plasticizer for the film backing of the tape of the patent."

The plaintiff's expert, Tierney[3], produced at the trial below a sample of tape made under his direction in which ethyl acrylate polymer was the sole plasticizer, and according to his testimony gave satisfactory results.

These references, however, do not support the plaintiff's contention or the Judge's finding. The specification does not show that ethyl acrylate polymer may be used as the sole plasticizer but, to the contrary, clearly teaches that it is to be used in place of the resinous plasticizer called for by the patent. The specification expressly states that "Paraplex G-25 is a preferred example of a suitable resinous type plasticizer" and then declares in the phrase above quoted that ethyl acrylate polymer is another high-molecular-weight plasticizer which has been found useful. Later in the specification ethyl acrylate polymer is again referred to as a high-molecular-weight plasticizer which "may be substituted in whole or in part for the specific alkyd resin hereinbefore mentioned"; and G-25 is described in the specification "as a soft viscous alkyd resin." Reading only these portions of the specification referring to ethyl acrylate polymer demonstrates the frailty of the plaintiff's contention and combining them with the emphatic assertion above quoted that both types of plasticizers must be used to give good results shows beyond question that the finding was clearly erroneous.[4]

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[3] Hubert James Tierney was chief chemist of the plaintiff company from 1934 to 1943, Tape Products manager from 1932 to 1948, manufacturing manager of the Tape Division of the company from 1948 until 1952, and since that time he has been vice president of the company in charge of Tape Research and Tape Manufacturing. He supervised the research by the inventors of the patent in suit during the experimental period.

[4] The following statement was made by the inventors during the progress of their application through the Patent Office, in order to distinguish their discovery from an earlier patent to Robertson. Referring to this patent they said:

"There is no suggestion of the three-way blend used by applicants, employing the vinyl chloride polymer, the liquid phthalyl

If Tierney, during the experimental period, had succeeded in making an insulating tape with a single plasticizer, the product doubtless would have been the basis for a patent claim, but it was "surprisingly found" that this could not be done. It is not sufficient for a patent to suggest a field for further experimentation; to be valid it must itself disclose the essential elements of the discovery so that persons skilled in the art may practice it (See U. S. C. § 1012; **Consolidated Electric Light Co. v. McKeesport Light Co.**, 159 U. S. 465; **Standard Brands v. National Grain Yeast Corp.**, 3 Cir., 101 F. 2d 814, affirmed, 308 U. S. 34. It follows that the scope of the patent in suit is limited by its disclosure and may not be extended to cover what other investigators subsequently discovered.

In addition to the references to ethyl acrylate polymer in the specification, the fact is stressed that a resinous plasticizer is comprised of light as well as heavy molecules; and the plaintiff strongly contends that these components may be so put together that the finished product will contain a liquid as well as a resinous element and thus constitute an equivalent of the blend of two kinds of plasticizers prescribed by the patent; and it is asserted that G-25 and G-40 are plasticizers of this sort and hence their use by the defendants constitutes infringement. The defendants concede that the use of a pre-blended mixture would be equivalent to mixing the two plasticizers during the process

ester, and the alkyl resin, combined together. That this three-way blend is essential to the success of applicants' product was clearly pointed out in the application as filed. Thus on page 2 it was pointed out that the phthalate plasticizer used alone resulted in inadequate stretch and elasticity, particularly in respect to backings of the thickness used in electrical tapes. If the plasticizer proportion is increased, the film becomes unstable because it makes the adhesive become soft and pasty. On the other hand, the resinous type plasticizer, if used alone in sufficient amount to impart desirable physical properties, results in the adhesive losing its tack (top of page 5). Obviously this Robertson patent does not teach applicants' discovery—first because it does not disclose their backing film, and second because it teaches nothing about the problems of pressure-sensitive tape backings."

of production. Hence the crucial inquiry is whether G-25 and G-40 actually contain a liquid as well as a resinous element.

It will be noticed that during the experimental period the patentees tried both G-25 and G-40 as a sole plasticizer and failed, but that later the defendants found that either could successfully be used alone. The plaintiff claims, however, that after 1944 the composition of G-25 was changed and that it now contains both liquid and resinous portions. In this respect the Judge made the specific finding that "Paraplex G-25, when the applicants for the patent worked with it in 1944 and 1945, was substantially different than it is today," and he added that in this earlier period the substance was in the process of development of manufacture, and that today G-25 and other polymerized plasticizers can be "tailored" to get the results which users desire. This change, the Judge suggested, explains the failure of the inventors in 1944 and the failure of Plymouth in 1948-50 to make the tape with G-25 as the sole plasticizer.

The Judge made the additional finding that by certain processes resinous plasticizers may be "fractionated" into the more viscous high-molecular-weight portions and the more liquid low-molecular-weight portions of the original materials[5]. Hence, the plaintiff contends that infringement has been established by the use of a resinous plasticizer alone notwithstanding the seeming teaching of the patent to the contrary.

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[5] According to the testimony of Tierney, G-40 when fractionated was found to contain 67% of the more viscous high-molecular-weight resinous portion and 33% of the more liquid lower-molecular-weight portion; G-25, 88% and 12%; ethyl acrylate polymer, 72% and 28%. The fractionation was done under Tierney's direction by a chemist who was not produced as a witness. The chemist was given no standard to follow in what should be considered the liquid and what should be the resinous portion of the fractionated material. The liquid portions produced was much more viscous than the plasticizers, such as DOP, which are known to the art as liquid plasticizers.

Our examination of the record convinces us that the findings on which this conclusion is largely based are not in accord with the great weight of the evidence. It is argued that there must have been a great change in the composition of G-25 as manufactured by Rohm and Haas because the plaintiff could not use it successfully as the sole plasticizer in 1944 and 1945, but can do so today. No comparison was offered by the plaintiff of the ingredients of the substance in the respective periods, with one exception: that in 1944 and 1945, G-25 had a film of oil on the surface of the containers whereas no oil is observable in the plasticizer supplied by Rohm and Haas to the plaintiff today. There was, however, no direct testimony that the film of oil affected the manufactured article adversely—the only evidence on the point being that of the defendants' expert, that the oil would be more helpful than otherwise. Moreover, the plaintiff was unable to make the tape in 1944-45 with G-25 of its own manufacture which bore no oil film on the surface, or with G-40, as to which there is no evidence or finding of change. It is of far greater importance to note that there is positive and direct testimony on the part of Rohm and Haas, who supplied G-25 and G-40 to both parties in the pending case, that there has been no significant change in G-25 since it was first put on the market[6].

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[6] In response to an inquiry, Rohm and Haas made the following statements in the course of their letter of December 20, 1954, addressed to both parties in the pending case:

". . . We normally prefer not to disclose details on the composition of our products, but we recognize that in view of the granting of this patent our customers will require considerable information on the PARAPLEX plasticizers and the differences that exist between them. We have accordingly prepared the following description of these products. We believe this description provides all the information concerning them needed for the resolution of questions arising out of the reissue patent."

[Here follows a description of the constituents of these materials.]

"PARAPLEXes G-25, G-40, G-50 and G-53 are all linear polyesters of aliphatic dicarboxylic acids and glycols. . . . These four

We reject also the contention that the patent teaches that the more liquid low-molecular-weight portions of a resinous plasticizer are the equivalent of a liquid plasticizer, such as DOP, which, according to the patent, must be used to secure a satisfactory insulating adhesive tape. The record does not support this thesis. The evidence clearly shows that there are two well defined and distinctive types of plasticizers, as the language of the specification indicates, which are not only well recognized by the trade but are characterized by substantial differences in chemical composition. The liquid plasticizers are all monomeric, that is, they are simple, precise and well defined chemical compounds of low-molecular weight ranging from 250 to 600. In them every molecule is like every other molecule so that the material cannot be fractionated. It is thinly fluid. DOP for example, has a molecular weight of 390 and a viscosity of less than one poise, which is the unit by which viscosities are measured. Resinous plasticizers on the other hand are polymeric. They are synthetic compositions made by combining chemicals of high-molecular-weight and are extremely viscous. G-25, for example, has a viscosity of 1000 poises. The molecules of these resins are combinations of varying numbers of so-called building units and accordingly vary in weight, ranging in the case of G-25 from 1,000 to 50,000. Its average molecular weight is 8000. It is substantially correct to say that no part of G-25 is liquid and no part of DOP is resinous, as these terms are known to the art. Tierney himself used the terms "liquid" and "resinous" as indicative of distinct

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Polyesters also differ in number average molecular weight as follows:

PARAPLEX G-25—8000
PARAPLEX G-40—6000
PARAPLEX G-50—2200
PARAPLEX G-53—3380

"In each of these products no significant change has been made since it was first offered for sale."

classes of plasticizers and testified that all portions of G-25 are resinous.

It may be that the lower weight molecules in the resinous plasticizers perform the function which the patent attributes to the liquid plasticizers in making the finished product with the result that both parties in the pending case now find that G-25 or G-40 may be used as the only plasticizer; but it is certain that the inventors were unaware of this fact and maintained the contrary positions. On this account the patent does not cover the defendants' product and infringement is not proved. Even if it be supposed that the composition of G-25 has been so changed as to contain a larger number of molecules of relatively low weight than the G-25 produced during the experimental period, and that by reason of this change it is now possible to use resinous material as a sole plasticizer, its use in making an insulating tape would not constitute infringement, because the plasticizer would still be completely resinous whereas the patent teaches that a liquid as well as a resinous plasticizer must be used.

Little need be said about claim 6 of the reissued patent. It provides for the use of a plasticizer "comprising at least a major proportion of non-migrating viscous plasticizer resin". If this dubious phrase means that only a resinous plasticizer need be used, the claim is invalid because it goes beyond the disclosure of the original patent; if, on the other hand, the phrase means that both liquid and resinous plasticizers are to be used, the claim is not infringed by the defendants.

Reversed and remanded.

JUDGMENT OF THE COURT OF APPEALS.

(April 1, 1957.)

Appeal from the United States District Court for the Middle District of North Carolina.

This cause came on to be heard on the record from the United States District Court for the Middle District of North Carolina, and was argued by counsel.

On consideration whereof, it is now here ordered, adjudged and decreed by this Court that the decree of the said District Court appealed from, in this cause, be, and the same is hereby, reversed with costs; and that this cause be, and the same is hereby, remanded to the United States District Court for the Middle District of North Carolina, at Greensboro, for further proceedings not inconsistent with the opinion of the Court filed herein, April 1, 1957.

Morris A. Soper,
United States Circuit Judge.

OPINION OF THE COURT OF APPEALS ON MOTION TO REOPEN AND PETITION FOR REHEARING.

(October 18, 1957.)

PER CURIAM:

After our decision in this case, **Sears, Roebuck and Co. and The Plymouth Rubber Co. v. Minnesota Mining and Manufacturing Co.**, 243 F. 2d 136, in which United States Reissue Patent No. 23,843 was held not to be infringed by the defendant, a petition for rehearing and a motion to reopen the case on the ground of newly discovered evidence were filed. The decision of the Court was based in large part upon the teaching of the patent that, in order to manufacture the patented adhesive insulating tape, it was necessary to use both a resinous or high molecular weight modifier, such as Paraplex G-25, but also a low molecular weight liquid plasticizer such as dioctyl phthalate. The evidence showed that in the manufacture of the infringing article the liquid plasticizer was omitted and only G-40, a resinous plasticizer substantially similar to G-25, was employed; and it was further shown at the trial that there had been no significant change in either G-25 or G-40 since these materials were first offered for sale.

It is now asserted that the newly discovered evidence will show that in fact G-25 has been substantially changed and is now different from that which was in use at the time of the invention, in that the present day article contains a larger proportion of small molecular weights. Hence it is contended that the infringing article is equivalent to the patented article, which contains both resinous and liquid plasticizers.

There is conflict in the evidence as to whether the plaintiff used due diligence at the time of the trial in procuring samples of G-25 which were then obtainable and showing

the composition of the present day article at that time. Assuming, however, that there was no lack of due diligence, the motion to reopen the case for the taking of additional evidence must be overruled, because even if the new evidence should demonstrate the alleged change in the composition of G-25, the decision of the Court would necessarily be retained. This is so because G-25, although changed to contain a larger quantity of low molecular weights, would nevertheless be a resinous plasticizer and would not be composed partly of a resinous and partly of a liquid plasticizer in accordance with the teaching of the patent. It is obvious from the record in this case that the defendant's successful operation was due to further research and not the teachings of the patent. As was said in the opinion of this Court: "It is not sufficient for a patent to suggest a field of further experimentation; to be valid it must itself disclose the essential elements of the discovery so that persons skilled in the art may practice it."

The futility of granting the motion for the taking of newly discovered evidence is also apparent from the fact that the Court in its opinion has already considered the possibility which the motion now presents. It was disposed of in the following words: "Even if it be supposed that the composition of G-25 has been so changed as to contain a larger number of molecules of relatively low weight than the G-25 produced during the experimental period, and that by reason of this change it is now possible to use resinous material as a sole plasticizer, its use in making an insulating tape would not constitute infringement, because the plasticizer would still be completely resinous whereas the patent teaches that a liquid as well as a resinous plasticizer must be used."

It is argued that there is infringement of Claims 6, 7, 8 and 9, which are new in the reissue patent, on the ground that they do not call for a liquid plasticizer. But, as pointed

out in our original opinion, these claims are vague with respect to the plasticizers to be used, for they merely provide for the use of a plasticizer "comprising at least a major proportion of non-migrating viscous plasticizer resin." If these claims are taken to mean that a liquid plasticizer is not used, they are void because not supported by the teachings of the original patent. Not only did the claims of that patent call for a liquid as well as a resinous plasticizer, but the teaching of the specification was that the use of the liquid plasticizer was essential and that the use of a resinous plasticizer alone would not produce satisfactory results. All of the claims of the reissued patent, whether old or new, must be construed in the light of this teaching and if the added claims are interpreted as excluding the use of a liquid plasticizer, the patent would be enlarged in scope and therefore void. See **U. S. Industrial Chemicals, Inc. v. Carbide and Carbon Chemicals**, 315 U. S. 668, 678, where it was said:

> "It is inadmissible to enlarge the scope of the original patent by recourse to expert testimony to the effect that a process described and claimed in the reissue, different from that described and claimed in the original patent, is, because equally efficacious, in substance that claimed originally. If such testimony could tip the scales on the issue of the validity of a reissue, it would always be possible to substitute any new combination of steps or elements or devices for the one originally described and claimed by proving that the omission of any one or more steps would not alter the result.
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> "This court has uniformly held that the omission from a reissue patent of one of the steps or elements prescribed in the original, thus broadening the claims to cover a new and different combination, renders the reissue void, even though the result attained is the same as that brought about by following the process claimed in the original patent."

For like reason, it cannot be held that under the doctrine of equivalents, the original patent is infringed. Without going into the question as to whether in the case of a combination patent what is claimed to be an equivalent must have been recognized as such at the time of the granting of the patent,* the doctrine of equivalents has no application where one of the elements called for is entirely omitted.

The petition for rehearing presents no questions that were not fully considered in the prior opinion of the Court. Accordingly, the petition for rehearing and the motion to reopen the case will both be denied.

ORDER DENYING MOTION TO REOPEN AND PETITION FOR REHEARING.

(October 18, 1957.)

On consideration of the petition of the appellee for a rehearing in the above-entitled case; and the motion of appellee to reopen the case on the ground of newly discovered evidence, and argument thereon:

It is, for reasons set forth in the opinion filed herewith, ordered by this Court that the petition for rehearing and the motion to reopen the case be, and both are hereby, denied.

October 18, 1957.

Morris A. Soper,
United States Circuit Judge.

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* *See Graver Mfg. Co. v. Linde Co.*, 339 U. S. 605, 609; *Halliburton Oil Well Cementing Co. v. Walker*, 329 U. S. 1, 13; *Fuller v. Yentzer*, 94 U. S. 288, 294-297; *Gill v. Wells*, 22 Wall. 1, 24; *Gould v. Rees*, 15 Wall. 187; *Seymour v. Osborne*, 11 Wall. 516; 40 Am. Jur., p. 650; 69 C. J. S., p. 870; *Cf. Technical Tape Corp. v. Minnesota Mining & Mfg. Corp.*, 2 Cir., ... F. 2d ...; *Finkelstein v. Kress*, 2 Cir., 113 F. 2d 131.

OPINION OF THE DISTRICT COURT.

(June 4, 1956.)

Hayes, District Judge:

This infringement suit is brought by the assignee of a patent on a pressure-sensitive stretchable and retractable vinyl plastic tape primarily for use as an electrical insulating tape. The original application was filed by Oace, Snell and Eastwold January 12, 1946, and Patent 2559990 issued July 10, 1951, naming them as assignors to the Minnesota Mining and Manufacturing Co. For convenience it will be referred to as the Oace Patent. Also involved is Reissue patent 23,843 of June 29, 1954, on application filed July 9, 1952. All available defenses are asserted.

Prior to the Oace invention, great difficulties with conventional methods of splicing electric conductors had been encountered, among others, the bulky and cumbersome and time consuming element in making splices; the materials available were ineffective under temperature changes of heat and moisture; the loss of tackiness (adhesiveness) and by becoming soft and pasty, resulting, in the tape then in use, in loosening and becoming ineffective. Slight increase in temperature above normal room temperature increased this tendency to impair the effectiveness of the splicing material with the consequent grave hazards of escaping voltage.

The Oace invention overcame these and other defects by providing an insulated spliced electrical conductor which is "electrically, mechanically and chemically effective" and is readily and quickly prepared without use of special procedures or equipment. These results are obtained by the use of an insulating tape in the form of a

relatively thick but easily stretchable and highly elastic pressure-sensitive adhesive tape comprising a well-bonded, water-insoluble, non-corrosive, normally Tacky and pressure-sensitive adhesive coating on a plasticized vinyl chloride polymer film which is in permanent equilibrium with the adhesive; it neither softens nor loses its adhering qualities on prolonged contact with the backing or film layer.

Oace found that high molecular weight modifier such as "Paraplex G-25," would produce the desired strength, stretch and elasticity in vinyl chloride polymer films, though classed as "non-migrating" or "permanent" plasticizers, failed to provide for permanent equilibrium of adhesive and backing. When tape made in that manner was unwound from the roll, after a moderate period of storage it would not adhere either to the electrical conductor or to its own backing, and was of no value as an insulating and protective coating. Oace provided an electrical insulating tape having stretch and elasticity rendering it highly effective for wrapping wire and cable splices.

It was stretchable to the extent of 50% at room temperature, by mere pulling with the hands; it could be stretched 30% at room temperature and would retract to substantially its original length. He discovered how to overcome moisture and temperature destruction and to prevent loss of adhesiveness due to migration. He gave examples of insulating tapes in the form of pressure-sensitive adhesive tapes having a vinyl polymer film base were prepared with a vinyl chloride vinyl acetate Copolymer softening at about 280 degrees F. and in the ratio of vinyl chloride to vinyl acetate of approximately 89:11. After giving many examples, he finds that the plasticizer must be compatible with the Vinyl polymer, and must be sufficiently low in Volitility so that it is not driven off during milling and calendering, or during subsequent storage and use.

After citing five examples of the various embodiments of his invention, for purposes of illustration rather than limitation, he makes the five claims set out in the margin.[1]

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[1] 1. A pressure-sensitive adhesive insulating tape wound upon itself in roll form and comprised of: a stretchable and elastic film backing having a thickness of 4 to 20 mils and formed of a homogeneous mixture primarily consisting of a stable blend of a film-forming polymer of monomers including at least a major proportion of vinyl chloride, a substantially non-volatile liquid phthalyl ester plasticizer amounting to 8 to 20 parts per 100 parts of said polymer, and a soft and viscous low-acid-number alkyd plasticizer resin in amount at least equal to the amount of said liquid phthalyl ester plasticizer, the total amount of said plasticizers being about 1/3 to 1/2 the amount of said polymer and the proportions being such that the adhesive tape has the properties of stretch and elasticity hereafter specified without causing pastiness or tack-loss of the contacting adhesive in the roll; and a cohesive normally tacky and pressure-sensitive rubber-resin type adhesive coating united to the inner face of said film backing; said adhesive tape being unwindable without delamination or offsetting of adhesive, being originally stretchable by hand-pulling to an extent of at least 50% at room temperature and being substantially completely retractable from an elongation of 30% as herein specified.

2. An adhesive tape according to claim 1, wherein the adhesive includes a small proportion of an oil-soluble heat-reactive phenol-aldehyde resin.

3. An adhesive tape according to claim 1 in which the film forming polymer is a copolymer of vinyl chloride and a minor proportion of vinyl acetate, said copolymer having a softening temperature of at least about 280 degrees C.

4. A pressure sensitive adhesive insulating tape wound upon itself in roll form and comprised of: (1) a stretchable and elastic film backing having a thickness of 4 to 10 mils and formed of a homogeneous mixture primarily consisting of a stable blend of 70 parts of copolymer of vinyl chloride and a minor proportion of vinyl acetate, about 10 parts of a substantially non-volatile liquid phthalyl ester plasticizer, and about 20 parts of a soft and viscous low-acid-number alkyd plasticizer resin; (2) an adhesive primer coating on the inside face of the film backing adapted to increase the anchorage of the adhesive coating; and (3) a cohesive normally tacky and pressure-sensitive rubber-resin type adhesive coating bonded to said primer coating; said adhesive tape being unwindable without delamination or offsetting of adhesive, being originally stretchable to an extent of at least 100% at room tem-

The reissue copies all contained in the original patent, and adds claims 6, 7, 8 and 9 to the five of original patent. Claim 6 typical of the others, is cited in the margin.[2]

The specification of the reissue is the same as the original patent except comment on the novelty of the tape and

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perature and being substantially completely retractable from an elongation of 30% as herein specified.

5. An adhesive tape according to claim 4, wherein the adhesive includes a small proportion of an oil-soluble heat-reactive phenol-aldehyde resin.

[2] 6. A pressure-sensitive adhesive insulating tape wound upon itself in roll form and comprising: (1) a water-insoluble and hydrocarbon-oil-insoluble film backing of high dielectric strength containing a stabilizer and having a thickness of 4-20 mils and formed of a homogeneous mixture primarily consisting of a stable blend of (a) a film-forming polymer of monomers including at least a major proportion of vinyl chloride, and (b) a substantially non-volatile plasticizing material therefor in an amount within the range of at least 1/3 the weight of said polymer but in a substantially lesser amount than said polymer and comprising at least a major proportion of a non-migrating viscous plasticizer resin, and the proportions being such that the adhesive tape has the properties of stretch, elasticity and retractability hereafter specified without causing pastiness or loss of the tack of the contacting adhesive in the roll; (2) an adhesive primer coating on the inner face of the film backing adapted to increase the anchorage of the adhesive coating; and (3) a water-insoluble normally tacky and pressure-sensitive rubber-resin type adhesive coating united to the inner face of said film backing, over said primer coating, said adhesive coating being firm in relation to said film backing; said film backing being in permanent equilibrium with said pressure-sensitive adhesive coating so as to avoid pastiness or loss of tack of the said adhesive coating and diminution of the flexibility of said film backing; said adhesive tape being unwindable from the roll without delamination of the tape or offsetting of the adhesive, being originally stretchable in widths not greater than about one inch by simple hand pulling, exercising a force of not more than about 10 to 15 pounds, to an extent of at least 50% at room temperature and being substantially completely retractable from an elongation of 30% as herein specified; said tape being readily conformable to irregular surfaces in insulating wire splices and its elasticity, retractability and high adhesion value making it easy, in insulated splices, to produce snug wrappings and coverings, and said tape having sufficiently aggressive adhesiveness to remain tightly and snugly wrapped around splices and wires.

definition of terms. There are no additional disclosures of a tape or how to make it. The claims of the reissue appear to embody nothing not disclosed in the original application and invention and they do not broaden the disclosures of the original patent but are further descriptive or illustrative of the teachings of the original patent. The recent case in the Fourth Circuit of Florence-Mayo Nuway Co. v. Hardy, 168 F. 2d 778, appears to state the principles of law applicable to the instant case. Applying the principles of law so ably stated by Judge Parker in Colgate-Palmolive Co. v. Carter Products, Inc., 230 F. 2d 855, to the facts in this case, we conclude that the patent is valid. The instant case and the Palmolive case above are not in conflict with the opinion in Sinclair Co. v. Inter Chemical Corp., 325 U. S. 327.

Much of the controversy here arises from the employment of Paraplex G-25 as one of the ingredients in the production of the tape by the plaintiff and by the defendants in the accused tapes.

It is perfectly clear that the Paraplex G-25, when the application for the original patent was filed, was of a substantially different formula than that of its later or subsequenf vintage. This old formula of Par. G-25, in part, accounted for the defects of the tape which became manifest from the exposure, change of moisture or temperature or from storage. The problem was to discover what to do to solve these difficulties. Once discovered and taught how Paraplex G-25 could not be used alone but the combinations with which it would add to the equilibrium of the tape and vastly prolong its usefulness and efficiency, and how to eliminate migration. The evidence abundantly shows that the subsequent vintage of Paraplex G-25 was altered and tailored so that, in a large measure, it overcame the migration. But the alteration of Paraplex G-25 * * * which in its new vintage included the old vintage of

Paraplex G-25 and the chemical product which plaintiffs discovered necessary to use in combination to solve the problem does not invalidate the patent or excuse the defendants from infringement.

If it be granted that there was a novelty in the chemical combination which resulted in a non-migrating adhesive tape which was resistant to changes of heat and moisture and storage, and if we conclude, as the evidence shows, that such a solution was discovered by using dioctyl phthalate or other plasticizer compatible with vinyl polymer and with a definite ratio which was sufficiently low in volatility so that it was not driven off during milling, storage or from exposure; and the desired film could be produced from a mixture of 700 parts of Vinylite VYNS, 200 parts of Paraplex G-25, 100 parts of dioctyl phthalate and 25 parts calcium stearate milled together and calendered to a thickness of 4 mils; to which was added a primer made of 985 lbs. of an ammoniacal casein with 624 lbs. of an aqueous dispersion containing 38% by weight of a copolymer of 50 parts butadiene and 50 parts styrene, after drying resulted in an extremely thin primer film; then add to the primed film the mixture of properly apportioned elements constituting the pressure-sensitive adhesive, the three elements—film, primer and adhesive—, resulting in the new combination for making the desired tape as is taught in the Otce patent, then it is obvious that a subsequent alteration of some of these elements, for example, by including two of them into one element, and thereafter using the result, could not invalidate the patent nor successfully avoid infringement. Judge L. Hand, in Royal Typewriter Co. v. Remington Rand, 2d Cir., 168 F. (2d) 691, 693, tersely stated the principle in these words: "Courts have with curious unanimity held that it does not avoid infringement to combine into one member that which the patent discloses as two if the single member performs the duties of both in the same way."

The accused tapes clairly infringe claims 1 of the original patent and 6 of the Reissue. Not only are the accused tapes the equivalent of the tape embodied in the above claims but they are practically identical in result. Moreover, they actually embody the very chemical equivalents taught in both the original patent and in the reissue. It is significant that Plymouth discounted the value and marketability of plaintiff's product until it became the leader in the electric tape field. Plymouth's salesman discovered this and afterwards Plymouth came out with the accused tapes. In August, 1947, General Electric, speaking of #33 Scotch electrical tape (under Oace patent), said: "For the first time in fifty years a revolutionary electrical tape is on the market ready for immediate delivery."

The commercial success of the patented tape was phenominal. In 1945 the sales were $8,270.19; in 1946, $94,000.00; in 1948, $1,500,000 and in 1953 reached $8,712,744.75. When Plymouth copied Oace patent, its sales jumped rapidly to $400,000.00 in 1952 and $500,000.00 in 1953. In 1950 and 1951, Plymouth's output was so small it did not bother to get the figures.

A decree will be entered permanently enjoining each defendant from further infringement and appointing Rufus Reynolds, Esq., to ascertain the damages.

PERTINENT FINDINGS OF FACT OF THE DISTRICT COURT.

29. The subject matter of the Oace et al. patent in suit is an electrical insulating tape in the form of a relatively thin (about 4 to 20 mils) backing film, which is easily stretchable (by simple hand pulling) and readily retraceable, combined with a well bonded water-insoluble, normally tacky and pressure-sensitive adhesive coating, the backing film being formed from a plasticized vinyl chloride polymer which is in permanent equilibrium with the adhesive coating in order that the adhesive will not soften (become pasty) or lose tack (become non-adherent), thereby providing an insulating tape that may be wound in a roll and unwound therefrom without delamination of the tape or offsetting of the adhesive.

30. The central problem to which the patent in suit is addressed, and which is solved, was to provide an insulating tape in the form of an easily stretchable and highly elastic pressure-sensitve adhesive tape comprising a well-bonded, water-insoluble, non-corrosive, normally tacky and pressure-sensitive coating on a plasticized vinyl chloride polymer film which is in permanent equilibrium with the adhesive.

31. The patent in suit teaches persons skilled in the art that ethyl acrylate polymer may be used as the plasticizer for the film backing of the tape of the patent. The patent discloses a plasticizing system which is satisfied by one or more ingredients of plasticizing material. There is in evidence a roll of pressure-sensitive insulating tape wherein the film backing is 100 parts of VYNS vinyl chloride copolymer resin plasticized with 50 parts by weight of ethyl acrylate polymer resin.

32. The Oace reissue specification introduced no new matter over the specification of the original Oace patent.

The only changes in the reissue patent specification from the specification of the original patent are the italicized portions appearing in columns 1, 8 and 9. None of the added portions makes a new disclosure of invention but rather are merely further discussions of the advantages claimed for this type of tape, or definitions.

33. Each of the claims in suit particularly points out and distinctly claims the invention disclosed in the patent in suit.

34. The reissue patent is for the same invention as the original patent. There is no change in disclosure; and the claims of the reissue comprehend no more than the inventors disclosed and intended to cover originally.

35. The original Oace patent was partly inoperative clearly and distinctly to cover, in literal terms, the inventions disclosed therein and intended to be claimed. This defect arose through error, and without any deceptive intention.

36. Lack of patent experience on the part of the applicants (Oace et al), and lack of understanding of the invention on the part of their patent solicitors constituted error justifying the Patent Office in its grant of the clarifying reissue.

37. Plasticization and migration are both physical phenomena.

38. Paraplex G-25 and Paraplex G-40 are respectively the polymerized reaction products of sebacic and adipic acid with a dihydric alcohol; and each is a soft, viscous linear polyester alkyd plasticizer resin.

39. In the process of polymerization, the composition of the resultant product depends upon the conditions of the polymerization, for example, time, temperature, the catalyst employed, and other factors, so that different types of polymers can be produced as desired.

40. Paraplex G-25 and Paraplex G-40 are represented by the manufacturer thereof to be "tailor-made", and to combine to a marked degree many of the desirable features of the more liquid ester-type plasticizers, such as dioctyl phthalate, with those features obtainable in resinous plasticizers.

41. Paraplex G-25 is represented by its manufacturer to be "a soft, tacky, viscous liquid which pours slowly at room temperature". Paraplex G-40 has even a lower viscosity than Paraplex G-25 at "slightly elevated temperatures".

42. Polyester plasticizers for vinyl chloride copolymers, such as Paraplex G-25 and Paraplex G-40 made by Rohm & Haas, may be fractionated by known procedures, but not by distillation, into the more viscous higher-molecular-weight portions and the more liquid lower-molecular-weight portions of the original material.

43. The more liquid portion of Paraplex G-40 is a liquid adipyl ester plasticizer. Both adipyl ester plasticizers and phthalyl ester plasticizers are plasticizers for vinyl chloride polymers; both are esters of organic carboxylic acids; both are liquid; and both are non-volatile.

44. Sebacic, adipic and phthalic acid esters are available as liquid plasticizers for vinyl chloride polymers, offered in commerce, and referred to in the literature in the same grouping; and all function by physical action in the same way to produce soft, pliable, stretchable and elastic polyvinyl chloride film.

45. When the lower-molecular-weight fraction of Paraplex G-40 is blended with the more viscous higher-molecular-weight portion, a plasticizer is obtained which, by physical action in combination with vinyl chloride polymers, functions in the same way to give essentially the same results as the combination of Paraplex G-25 and dioctyl phthalate in the ration of 2 to 1.

46. The more liquid lower-molecular-weight portion of Paraplex G-40 constitutes about 33% thereof. This portion is a liquid adipyl ester plasticizer; and is the equivalent of a liquid phthalyl ester plasticizer. The ratio of two parts of higher-molecular-weight viscous resinous plasticizer to one part of more liquid lower-molecular-weight plasticizer found in Paraplex G-40 is within the recommended range of examples of the Oace patent. The use of Paraplex G-40 as the plasticizing material in the accused Plymouth tapes produces the same results in the same way by the same or equivalent means as the examples of the patent in suit.

47. A person skilled in the art can produce the tape as disclosed by the Oace patent by following the teachings of the patent. Plaintiff's commercial tape is made in accordance with the teachings of the patent. The accused tape was not derived from the prior art; rather it was produced by Plymouth and Technical Tape, respectively, essentially by duplicating plaintiff's commercial tape.

48. The purpose of vacuum stripping during the manufacture of Paraplex G-25 and Paraplex G-40 by Rohm & Haas is to remove free glycol and water which may result from the poly-esterification, and does not remove ester material of the order of 300, 400 or 500 molecular weight. The building unit, or monomer, of both G-25 and G-40 has a molecular weight falling within the range of about 300-350.

49. Paraplex G-25, when the applicants for the patent in suit worked with it in 1944 and 1945, was significantly different than it is today.

A. The attempt of Oace et al. in 1944 to make their tape with Paraplex G-25 as the sole plasticizer led to a tape which was unsuccessful and quickly lost its tack.

B. Danovitch of Plymouth could not make tape with G-25 as the sole plasticizer in the period from 1948-1950.

C. In late 1943 and 1944, Paraplex G-25 was in the process of development for manufacture on both a pilot-plant and plant scale. Its composition by that time had been defined research-wise "at least in respect to its major features". The first production batch of Paraplex G-25 was not made until early 1944.

D. In the production of Paraplex G-25 in recent years, Rohm & Haas, the manufacturer, has held the product to narrower specifications.

E. Paraplex G-25, like other polymerized plasticizers, can be tailored by process controls, and is so tailored, to get desired results to meet customers' demands.

F. Paraplex G-25 of recent vintage as the sole plasticizer will make suitable tape today, although still not as good as when some additional low molecular weight plasticizer is used.

G. Paraplex G-25 of 1944 and 1945 vintage had an oil film on its surface in the containers; recent vintage Paraplex G-25 does not have an oil film

H. Paraplex G-25 is not a chemically-pure compound, even today.

50. The use of Paraplex G-25 of recent vintage as the plasticizer material in the film backing makes a tape of satisfactory aging life, fully responsive to the disclosure of the patent, although there is a relatively low amount of tack loss. The quality of such tape is improved when a small amount of a more liquid plasticizer, such as dioctyl phthalate, is added to the plasticizer material.

51. The more liquid lower-molecular-weight portion of the recent vintage Paraplex G-25 constitutes about 11% thereof. This portion is a liquid sebacyl ester plasticizer. The ratio of about 8 or 9 parts of higher-molecular-weight viscous alkyd resin plasticizer to about 1 part of more liquid

lower-molecular-weight plasticizer found in this Paraplex G-25 is within the compass and scope of the Oace patent. The use of Paraplex G-25 as the plasticizing material in the accused Plymouth tapes produces the same results in the same way by the same or equivalent means as the examples of the patent in suit.

52. The plasticizing materials herein found to be full equivalents for those specifically recited ingredients disclosed in the patent in suit are either tailor-made for the purpose or are normal, well-known substitution products for the material specified in the patent, and which would be used by persons skilled in the art without experimentation.

53. The accused Plymouth Plastic Electrical Tape which utilizes Paraplex G-40 as the plasticizing material, made and sold by the defendant Plymouth Rubber Company, Inc., and sold by defendants in these consolidated cases, responds to all of the requirements of each of claims 1, 3, 4, 6, 7, 8 and 9 of reissue patent in suit, and infringes each of said claims.

54. The accused Plymouth Plastic Electrical Tape which utilizes Paraplex G-25 as the plasticizing material, made and sold by the defendant Plymouth Rubber Company, Inc., and sold by the defendant Sears, Roebuck and Company, responds to all of the requirements of each of claims 1, 3, 4, 6, 7, 8, and 9 of the reissue patent in suit, and infringes each of said claims.